Technical Report 868

Military Retirement Accrual Charge as a Signal for Defense Resource Allocation

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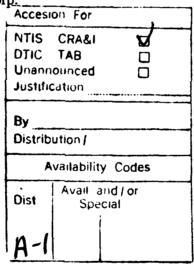
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The effectiveness of our national defense depends not only on the total resources devoted to defense, but also on how those resources are allocated. An efficient allocation of resources is a function of the relative prices of the factors of production. We argue that the current accrual accounting method for military retirement distorts the price of manpower. Although the current system, which charges all services identical retirement rates, may be actuarially fair across the Department of Defense, services with high turnover exhibit manpower prices that exceed actual costs, while services with low turnover are perceived to have relatively lower costs. Because manpower costs generally comprise a large portion of the cost of operating and maintaining hardware systems over their life cycle, distortions in the price of manpower may influence what hardware systems are purchased, the relative expenditures on manpower and hardware systems, and the relative size of the services, thus leading to an inefficient choice of resources and a reduction in national defense.

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Technical Report 868

Military Retirement Accrual Charge as a Signal for Defense Resource Allocation

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The Manpower and Personnel Policy Research Group of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) performs economic research on manpower, personnel, and training issues of particular significance to the U.S. Army. Questions about the cost of manpower have generated continuing interest and lead to the development of the Army Manpower Cost System (AMCOS), an automated system used to calculate detailed cost estimates for manpower.

This report was prepared as part of the Program Task Manpower Cost and Compensation of the Manpower and Personnel Research Laboratory under the Memorandum of Agreement between the Office of the Assistant Secretary of the Army (Financial Management) and the U.S. Army Research Institute for the Behavioral and Social Sciences. This report was reviewed and accepted by the U.S. Army Cost and Economic Analysis Center in April 1989.

EDGAR M. JOHNSON
Technical Director

THE MILITARY RETIREMENT ACCRUAL CHARGE AS A SIGNAL FOR DEFENSE RESOURCE ALLOCATION

EXECUTIVE SUMMARY

Requirement:

The U.S. Army Research Institute for the Behavioral and Social Sciences conducts research on manpower, personnel, and training issues of particular significance and interest to the U.S. Army. This research was conducted as part of the development of the Army Manpower Cost System (AMCOS), an automated system used to calculate detailed cost estimates for manpower. This system is being developed for the Office of the Assistant Secretary of the Army (Financial Management).

Procedure:

The authors used Army-specific continuation rates to calculate continuation rates for Army personnel, based on occupational specialties.

Findings:

The results of this research demonstrate that the Army is charged too much for its retirement program because Army-specific continuation rates are below the Department of Defense (DoD) average, but all services are charged the same normal cost percentage.

Utilization of Findings:

The results of this report suggest that implementation of Service-specific continuation rates would improve the allocation of resources within the Department of Defense. An efficient allocation of resources requires accurate price information on the factors of production. The effect of a single DoD normal cost percentage for all services has the effect of distorting manpower prices, thus distorting cost estimates associated with hardware systems or different personnel configurations.

THE MILITARY RETIREMENT ACCRUAL CHARGE AS A SIGNAL FOR DEFENSE RESOURCE
ALLOCATION

CONTENTS

LIST OF TABLES

THE MILITARY RETIREMENT ACCRUAL CHARGE AS A SIGNAL FOR DEFENSE RESOURCE ALLOCATION

INTRODUCTION

The military retirement program is a powerful incentive both for recruiting and retention in the Armed Services. In this defined benefit system soldiers, sailors, airmen and marines are fully vested only upon 20 years of service, but are able to retire immediately upon vesting and begin drawing full retirement benefits. The retirement benefits are calculated at 2.5 percentage points times years of service, not to exceed 50% of salary for 20 years of service or 75% of salary for 30 years of service.[1] Retirement benefits are indexed to inflation, protecting the real value of the income stream. The total cost of the military retirement program has been an issue for debate for decades. However, the subject of this paper is whether the signals provided by the current financing methods for resource allocation and the implications for efficiency.

A salient feature of employer-sponsored pension programs is that the firm or organization incurs a liability for the employee's future pension, either implicitly or explicitly, over the employment tenure of the employee. Actual cash payments to the employee are deferred until some future date when the employee retires and draws his annuity. How the organization accounts for this future liability will determine, in part, how costly they perceive personnel to be. This will affect the mix of people and other productive resources they choose to achieve their goals.

Actuarial vs. "Pay as You Go"

The costs of a defined benefit retirement program can be budgeted in one of two general ways. First, retirement expenses can be paid when they come due out of the current revenues of the organization. There is a risk to the employee, however, that the employer may default, either because of the financial condition of the organization or moral hazard.[2] Second, the organization may set aside a portion of its current revenues to fund the pension system currently in anticipation of its future liabilities. In a retirement program with explicit funding of future retirement liabilities, the expected present value of pension liabilities is equal to the discounted value of the firm's contributions to the pension fund at a given point in time.

There are (at least) three reasons why an organization may want to set aside resources currently to fund its future retirement annuity payments. First, setting aside the funds now will provide the resources to pay the future outlays. Current revenues are saved by the organization and invested in activities that produce a positive real rate of return. This lowers the risk of default to employees, lowering the total compensation costs necessary to attract and keep the desired work force. Second, explicit consideration of the pension related costs of personnel will improve the efficiency of the organization.[3] Finally, tax benefits from pension funding accrue to private, for-profit firms and are a third reason for current funding.

1

The Department of Defense (DoD) changed from a "pay as you go" system of funding the military retirement system to an accrual funding system in 1985. The purpose of the federal accrual accounting system, however, is not the explicit accumulation of real resources in order to pay future obligations. Once an estimate of the annual accrual charge for the retirement system is made, the government implicitly sells its own bonds to itself to "fund" the system. The transaction is purely internal, with no explicit net effect on the private sector.[4] However, the change to an actuarial system of accrual accounting has, potentially, real effects on the allocation of resources.

Prior to 1985, an estimate of retirement outlays expected to be paid to military retirees in the budget year appeared in an account in the DoD budget. There was no attempt to allocate the costs among Services. Moreover, there was no link between current force manning decisions of the military Service and its current budget. The estimate of payments made to military retiree annuitants reflected Defense resource allocation decisions made years earlier.

Under the accrual accounting procedures begun in 1985, an estimate of the accrual liability for each Service's current force appears in that Service's budget. The accrual charge, estimated using the entry-age normal method described below, is calculated as a constant percentage of basic pay. Though the real price of manpower is independent of accounting procedures, it does affect the incentives for resource allocation within a fixed budget. The change to accrual accounting, though in itself only an accounting change, has real effects on the allocation of resources through three major channels:

1. Aggregate private saving. To the extent that taxpayers obtain a better estimate of their future tax liabilities under an accrual system, and this affects their private savings decisions, an accrual system can improve the efficiency of intertemporal resource allocation decisions and lower the cost of the retirement program.[5]

2. DoD Budget Constraints. If the DoD budget is a binding constraint, accrual estimates charged to the military Services crowd out expenditures on tanks, planes, ships, munitions, and people, and thereby have a real effect on the DoD budget.

3. Relative Price of Military Manpower. The accrual charge for the military retirement system affects the current budget price of military manpower, relative to other resources used in producing the nation's defense, and can affect the relative price of various types of military manpower. The budget cost of manpower intensive methods of producing deterrence, such as land forces, will have risen relative to capital intensive methods, such as tactical aircraft, in the Defense budget. Hence, the change to accrual accounting for military retirement will affect the mix of resources chosen for the nation's defenses.

This paper is concerned primarily with the effect that accrual accounting, as currently practiced within the Department of Defense, has on resource allocation and economic efficiency. The ultimate justification of any method of accounting for retirement costs is that method leads to a better allocation of resources. The accrual charge for military retirement affects the budget price of manpower relative to other resources and the relative price of various types of manpower. Relative budget prices will affect the allocation of resources within the DoD. Accrual accounting for military retirement will improve the efficiency of resource allocation if it results in a budget price of manpower that more closely reflects its real cost.[6] However, if the accrual method distorts the

2

relative budget price of manpower, it may result in an inefficient choice of resources. Below, we argue that the current system of accrual accounting for military retirement does tend to distort the budget price of manpower in many instances.

CURRENT ACTUARIAL PRACTICES

The fundamental actuarial constraint is simply that the expected present value of retirement outlays is equal to the expected present value of contributions:

1. $\sum_t E(C_t)/(1+r)^t = \sum_t E(Q_t)/(1+r)^t$

where C_t is the contribution to the retirement fund at time t, Q_t is the payment made to retirees at t, r is the real discount rate, and E is the expectations operator. All cash flows are assumed to be in constant dollars. All cash flows are assumed to be in constant dollars.

Within this constraint, there are many ways to account for the expected costs of the military retirement system. For example, one could account for the entire retirement liability for an employee by (implicitly) depositing the expected present value of future outlays at the time he is hired. Or, one could make an equivalent deposit at the time an employee retirees. Finally, one could allocate expected future retirement outlays over the expected working life of the employee. Ideally, one should choose that method of accounting for military retirement costs that provides the appropriate budget price signal for optimal resource allocation. That is, one should choose the method of accounting that most closely reflects the real economic costs of manpower allocation decisions, for example, hiring, promotions, and separations. The best way to do this is not obvious. The Department of Defense takes the accrual approach to accounting for the retirement system, in what is known as the "aggregate entry age normal method" of calculating the retirement accrual. Under this method, retirement costs accrue as a percentage of basic military pay that is the same regardless of Service affiliation, officer or enlisted status, or military skill. In the remainder of this paper, we will accept the entry-age normal method as a sound way to reflect the economic costs of pension liabilities, even though it is not without shortcomings.

In the entry-age normal method of accrual accounting, the annual retirement accrual is calculated as a proportion of basic pay. Let the expected present value of basic pay over the members career be given by:

2. $PV(B) = \sum_{t=1}^{R} P_t B_t/(1+r)^t$

where P_t is the probability of staying to year of Service t, B_t is basic pay in year of service t, r is the discount rate, and R is the retirement point. The expected present value of retirement outlays is:

3. $PV(Q) = \sum_{t=R}^{T} S_t Q_t/(1+r)^t,$

3

where Q_t is the retirement payment in year t, S_t is the probability of receiving payment in year t, and T is the expected period of death.

The normal cost percentage is that portion of basic pay that must be set aside each year to fund the system. If military members implicitly contribute the proportion A of basic pay then:

4.   A = PV(B)/PV(Q)

and 100A is the normal cost percentage.

The annual retirement cost of an individual member is equal to basic pay multiplied by the normal cost percentage. This total is also the annual retirement accrual for DoD.[7]

Budget Cost Implications

Calculated in this fashion, the normal cost percentage has remained relatively stable each year at around 51% of basic pay. The budget cost implications of accrual accounting have varied by Service, because the Services differ in their overall manpower intensity. The total budgets and the accrual accounting costs for each Service are substantial. Between FY 1984, the year prior to implementation of accrual accounting, and FY 1987, the budgets of the Departments of the Army, Navy, and Air Force grew by 19%, 13.9%, and 6.4% respectively, in nominal terms. However, roughly half of this increase for the Army and Navy was due solely to an accounti ng change, the implementation of accrual accounting for military retirement. Approximately 100% of the nominal growth in the Air Force's budget over this period was due to the accounting change. Because of the size of the accrual charge relative to the nominal growth in the budgets, imposition of accrual accounting undoubtedly crowded out expenditures on weapons systems and their operations and support.

One of the deficiencies in the current system is that the DoD actuary charges each Service an identical normal cost percentage, 51.2 percent in FY 1987, based on DoD retention experience (scheduled to fall to 48.5 by FY 1991). This practice implies similar retention patterns across the Services. However, officers, in general, have much higher retention rates than enlisted personnel. Moreover retention rates vary significantly among the Services. As the numbers in Table 1 indicate, the probability that a soldier will reenlist after an initial tour varies considerably across Services. Retention in the Army and the Marine Corps is well below that of the Navy and Air Force. These differences indicate that the Army and Marine Corps are subsidizing the military retirement programs of the other Services.[8]

Table 1

Reenlistment Rates by Service[9]

Total DoD	Army	Navy	Marine Corps	Air Force
46.6%	35.9%	54.0%	35.4%	71.9%

4

When Army-specific continuation rates are used to compute a normal cost percentage for retirement, the actual cost percentage for enlisted personnel is 38 percent, well below the normal cost percentage applied across all the Services. Using this differential, the retirement cost of personnel appears to be significantly overstated.

One consequence of charging a single normal cost percentage is that the costs of manpower are overstated in Services with higher turnover, and understated in Services with low turnover. This divergence between actual and perceived costs has implications for the allocation of resources across the services. Manpower price distortions occur that may result in real efficiency losses to DoD. The fact that the services have different continuation rates but are charged similar cost percentages has previously been recognized. The argument for changing to Service-specific normal cost percentages has been based on equity grounds, because the current system creates a redistribution of resources among Services. This justification is weak; the cost burden can be simply offset by reallocating Service budgets. The distortions that arise from inaccurate manpower prices, however, impose real resource costs. The efficiency loss issue is discussed in greater detail in the following section.

RESOURCE ALLOCATION EFFECTS

Efficient production of national defense means that national defense is the maximum amount of defense is produced for the resources expended. DoD can be viewed from the perspective of a firm that produces a single output (national defense) with several plants (the individual Services), each of which is subject to physical constraints that determine the combinations of inputs required to produce output.

The first-order conditions necessary for efficient production, familiar in the economics literature,[10] require that the marginal rates of substitution are equalized across all inputs for each Service. For simplicity, assume two types of inputs exist: labor (L) and capital (K), for each Service. This first-order condition can be expressed as:

5. $MP_L/P_L = MP_K/P_K$,

where MP_L and MP_K represent the marginal products of labor and capital respectively, that is, the additional output generated with one additional unit of labor or capital. If the additional output produced from an additional dollar spent on labor is not equal to the additional product of the last dollar spent on capital, another mix of inputs using more of the relatively inexpensive input could result in producing either (a) more output at the same total cost, or (b) the same output at less cost. Thus efficient production requires that the condition expressed in equation 5 is fulfilled.

To reflect the fact that each Service uses unique labor inputs, equation 5 can be expanded:

6. $MP_{Li}/P_{Li} = MP_{Lj}/P_{Lj} = MP_K/P_K$.

This condition requires that the marginal product per dollar (at the margin, that is, for the last dollar) be equalized for all inputs across the Services , where i, j denote different Services. If the price of manpower were equal across the Services, the size of each Service should be determined such that the same contribution to national defense

5

would be provided by the last individual recruited. However, manpower costs may vary for numerous reasons, such as differences in recruiting costs, retention rates or force structure. Thus the manpower levels associated with any one Service should depend upon the marginal product of labor in that Service, the marginal product of labor in other Services, the marginal product of capital, and the relative prices of each of these inputs if each Service is efficient. Should the price of any one of these inputs rise, then other things constant there should be a substitution away from the relatively more expensive input toward other inputs.

Two consequences follow from inflated manpower costs in the Army. First, as manpower is perceived to be more expensive relative to equipment, more equipment will be substituted for manpower. Systems with more automated operations and maintenance will appear to be more efficient than labor-intensive systems. Secondly, Army manpower will appear more expensive relative to the Navy and Air Force. Thus some substitution away from Army manpower in favor of these Services would be expected under the current system of funding military retirement. Both substitution effects represent efficient responses to real price changes. However, to the extent that the increased cost of Army manpower does not represent real resource costs, such substitution effects would reduce the efficiency of DoD, and result in increased costs of providing a fixed level of national defense. Inflated Army manpower costs provide inaccurate price signals both to the Army and to DoD.

An example may be useful to illustrate the potential costs associated these substitution effects. Assume that one member of a tank crew, the loader, could be replaced by equipment (an automatic loader) costing $390,000 each (including maintenance costs, etc.). Also assume a twenty year life-cycle of a tank, an inflation rate of 5% and a discount rate of 10%. The present value of the manpower cost over the life cycle using DoD actuary retirement costs for the loader at an E-3 pay grade is $392,000 (using AMCOS). A comparison of these costs suggests that it would be cost-effective to purchase the equipment. However, using Army-specific continuation rates the present value of manpower costs over the twenty year life-cycle is calculated to be $347,000, somewhat lower that the previous cost estimate because Army-specific continuation rates are less that DoD average rates. Thus the costs of the automatic loaders, which appeared to be cost-effective under the DoD actuary assumptions, would actually increase total costs by $43 million. These cost differentials would increase as the life-cycle of the system is increased. Moreover, although these costs may appear relatively small, consider that the Army has purchased over 12,000 M1 tanks.

Although the above example is simple, it illustrates a substitution effect associated with establishing resource pricing that does not reflect true resource costs. Efficient production of national security, similar to the production of any output in the private or public sector, requires an appropriate combination of inputs based on the prices and the marginal products of those inputs. Prices that do not reflect the true cost of resources distort the production process in the sense that an incorrect combination of resources will be utilized in the production of national defense. On a broader scale, the current system encourages substitution away from manpower-intensive services towards capital intensive services, resulting in more airwings and battle groups and fewer divisions.

Although the current system of retirement pay accrual may have some advantages, the distortions introduced by charging each of the Services on the basis of DoD-wide continuation rates is likely to exceed such advantages. The previous "pay as you go" system

may be more efficient than the current system. However, the current system can be modified by introduction of Service-specific continuation probabilities.

To give an indication of sample sizes used for estimating Service-specific rates, the total active duty military personnel by Service totals 197,127 for the marine corps, 581,759 for the Navy, 594,660 for the Air Force and 768,221 for the Army. These numbers should be large enough to provide stable estimates of continuation rates. These statistics are from Department of Defense Total Active Duty Military Personnel By Service, (Table P22.1, p.5).

The disaggregation of retention probabilities by Service could be carried beyond service-specific rates. Retention can vary widely across military occupational specialties, so cost comparisons of systems utilizing different specialties might be sensitive to such variations in continuation rates. However, continuation rates for smaller occupational specialties are less stable over time. Career Management Field (which are comprised of similar Army occupational specialties) continuation rates are used in the Army Manpower Cost System (AMCOS) to generate Army-specific retirement costs as an alternative to the DoD actuary costs. This system generates costs associated with any manpower configuration, and can provide costs over a 30 year life cycle. The continuation rates at this level are likely to be relatively stable over time given stability in the retirement system and given no major changes in the structure of each Service. As might be expected, the retirement costs based on Army-specific continuation rates for career management fields differ substantially from those calculated using the single DoD retirement cost factor.

CONCLUSION

Continuation probabilities for military personnel vary systematically across the Services. Relatively fewer soldiers remain in the Army or the Marine Corps for the full 20 years, so the retirement costs per soldier are lower in these Services. To the extent that all the Services are charged the same normal cost percentage, the perceived costs of manpower do not reflect actual costs and may result in inefficiencies in the allocation of resources across Services, and between manpower and other inputs within each Services. The magnitudes of these costs are not small. The consequence is that the taxpayers pay more for achieving a given level of national defense.

The use of Service-specific continuation probabilities to estimate military retirement costs should improve the efficiency of producing national defense. If continuation probabilities within large military occupational specialties or for combinations of these specialties were sufficiently stable, then incorporating these into retirement costs could provide better cost signals for resource allocation. The allocation
of resources within DoD is expected to become more efficient as prices more accurately reflect the true cost of those resources.

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NOTES

1. Those who entered the Armed Forces after 1980 are subject to different rules.

2. Since the passage of the Employee Retirement Income Security Act (ERISA), private sector firms must attempt to actuarially fund their systems.

3. If an organization or company is efficient, they choose a combination of resources that minimizes the costs of accomplishing its goals. To do this, they must have estimates not only of the amount various resources contribute, but also what is given up by the use of those resources -- the costs. Personnel related costs are the largest element of the total costs in most organizations or firms, both in the private and public sectors. The costs of a retirement pension program are typically a major component of personnel costs.

4. If the government sold bonds and used the proceeds to buy real assets there would be an explicit net effect, relative to the pay as you go system.

5. As noted previously, the federal government does not set aside real resources for the funding of the retirement system. It is purely an accounting transaction. The system is "funded" only when there is a transfer of claims to real resources from the general taxpayer to the military annuitant. Individual taxpayers can "fund" the system, however, by saving more out of current income in anticipation of higher future tax liabilities due to the retirement system. To the extent that accrual funding provides the taxpayer with a better estimate of these liabilities, permitting him to plan better, resource allocation is improved.

6. The "cost" we are considering is manpower's opportunity cost -- the value of resources implicitly given by buying manpower rather than some other input, at the margin.

7. This exposition simplifies the actual calculations somewhat. For example, we ignore disability retirements. However, the essential elements of the calculation, and our argument is unaffected by the simplification.

8. To illustrate the magnitudes involved, consider that the Army is charged, on average, $4,827 per year for the retirement costs of a first term soldier in pay grades E1-E3. However, the real cost based on Army-specific continuation rates (generated by the Army Manpower Cost System, AMCOS) is $1,309 per year. Calculations suggest that of approximately $5.9 billion the Army was charged to cover its active force retirement pay accrual costs in fiscal year 1989 (from The Army Budget Fiscal Year 1988-89, Comptroller of the Army, February 1987), $2.2 billion represents a subsidy to other services. A separate, DoD rate is applied to the reserve component. We have not calculated the potential subsidy on the Army's retirement charge of $1 billion per year for the Army Reserve and National Guard.

9. These are first-term reenlistment rates, adjusted to exclude early separations for immediate reenlistment and other discharges of eligibles under early release programs for strength purposes. These numbers were extracted from the Department of Defense Military Manpower Statistics, Quarter ending March 31, 1988 (Table P29/20-29.34), p. 33.

10. The basic theory can be found in any microeconomic text, e.g. Hal R. Varian, Microeconomic Analysis, Second Edition. New York: W. W. Norton & Co. (1984).

11